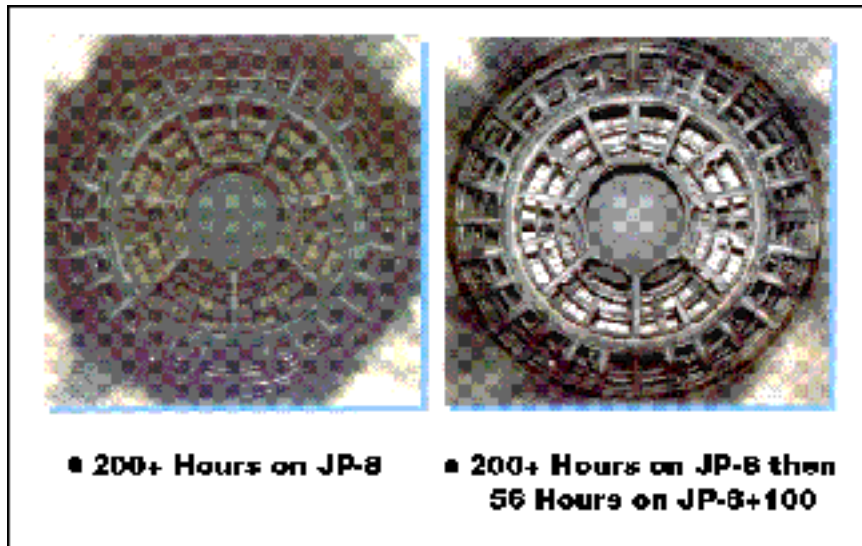




JP-8+100 FUEL TECHNOLOGY TRANSITIONED



Payoff

JP-8+100 is improved JP-8 fuel with a "fuel injector cleaner" (additive) that reduces fouling/coking in engine fuel controls, mainburner fuel nozzles, manifolds and augmentor sprayings/spraybars and reduces smoke and soot in older engines. JP-8+100 will reduce engine and aircraft fuel system operation and maintenance costs for current and future aircraft. To initiate its transition, the JP-8 specification (MIL-T-83133D) was amended to allow limited use of the additive with approval for planned fleet-wide use in fiscal year 1998.

Accomplishment

The Fuels Branch of the Propulsion Directorate led a government/industry/academia team in the development and demonstration of additives that improve thermal stability in JP-8 fuel. These "fuel injector cleaner" type additives increase the thermal stability of JP-8 by 100°F (from 325°F to 425°F) and significantly reduce fuel fouling and coking.

Background

Fuel is the primary coolant for engine and aircraft subsystems. In many current high performance engines, fuel is heated to temperatures above 325°F, the thermal stability limit of JP-8. When the thermal stability limit is exceeded, the fuel breaks down into gums, varnishes and carbon deposits (coke). These deposits cause degraded performance in engine fuel controls, fuel nozzles, and augmentor sprayings/spraybars. When fuel nozzles or augmentor sprayings/spraybars coke, combustion spray patterns are distorted and acoustic resonances that can lead to high cycle fatigue are created. The additives were tested in-house in over 1000 hours of ground engine tests and

flight tested by the 416th Flight Test Squadron at Edwards AFB in September 1994. An F-16A with an F100-PW-200E engine was piloted through dry power and augmentor transients, primary and secondary fuel control transfers and 28 air starts. With the success of the flight test, a base demonstration was initiated with the Air National Guard (ANG) at Kingsley Field OR. Nineteen F-16A/B aircraft with F100-PW-200 engines have flown over 3000 hours and demonstrated a significant reduction in engine maintenance costs with JP-8+100. The improved fuel has increased the mean time between fuel related engine anomalies by 340 percent. Fuel system maintenance costs have been reduced from \$374 per flight hour with JP-8 to \$106 per flight hour with JP-8+100. Maintenance manhours have been reduced from 45 minutes/flight hour with JP-8 to 12 minutes/flight hour with JP-8+100. The ANG unit at Kingsley Field documented maintenance savings in excess of \$825,000 in fiscal year 1995. The Air Education and Training Command is also supporting a base demonstration of JP-8+100 in T-37/T-38 aircraft at Sheppard AFB TX. The aircraft have flown over 2500 flight hours and have demonstrated dramatic reductions in fouling/coking and smoke. Based on extrapolation of the data obtained, the Air Force could have a cost avoidance of as much as \$80 million/year in maintenance.